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PROBLEMS FOR SOLUTION.

ALGEBRA.

306. Proposed by J. C. CORBIN, Pine Bluff, Ark.

Muir gives the following problem:

$$\text{Prove: } \begin{vmatrix} 1 & a & a & a^2 \\ 1 & b & b & b^2 \\ 1 & c & c' & cc' \\ 1 & d & d' & dd' \end{vmatrix} = (a-b) \begin{vmatrix} 1 & ab & a+b \\ 1 & cd' & c+d' \\ 1 & c'd & c'+d \end{vmatrix}$$

which, of course, can be solved by finding the terms of both determinants. Is there any method of changing from one form to the other which is direct?

307. Proposed by J. SCHEFFER, Hagerstown, Md.

If $y^x=2$ and $x^y=3$, find x and y.

GEOMETRY.

339. Proposed by G. E. BROCKWAY, Boston, Mass.

Of all triangles that can be inscribed in a given triangle, that formed by joining the feet of the altitudes has the minimum perimeter. Prove by means of the straight line and circle.

340. Proposed by J. H. MEYERS, S. J., Sacred Heart College, Augusta, Ga.

Given trapezoid $ABCD$. Prolong AB and CD, the non-parallel sides, to meet in E. On AE as diameter construct semi-circle $ALGE$. With BE as radius construct arc BG. Draw GH perpendicular to AE. Bisect AH at K. Erect KL perpendicular to AE. Construct arc LM with LE as radius. Draw MN perpendicular to DC. Prove that MN bisects the trapezoid $ABCD$, angles ADC and BCD being right angles.

CALCULUS.

265. Proposed by V. M. SPUNAR, M. and E. E., East Pittsburg, Pa.

Find two curves which possess the property that the tangents TP and TQ to the inner one always make equal angles with the tangent TT' to the outer.

266. Proposed by C. N. SCHMALL, New York City.

Show that the nth derivative of the fraction u/v can be expressed in the form of a determinant, u and v being functions of x.

MECHANICS.

221. Proposed by W. J. GREENSTREET, Stroud, England.

Two smooth intersecting planes are each at 45° to the horizon. Between them lies a cylinder of elliptic cross section. Find the position of equilibrium.